

NRGA Weather-Climate Update
Thursday 21 April, 2016

Summer's End [and]
The Bigger Picture



Greetings All,

The previous week was rather moist across the entire region, as we see in 1), the NWS 7-Day observed precipitation image, up to 6am today. **Almost all areas received wetting precipitation.** Most of this over the western PSAs occurred late last week, as an upper-level low tracked through, then slipped southeast. Much greater precipitation amounts occurred in Central Montana last weekend, and southern North Dakota, last Sunday and Monday.

Something extraordinary happened though to our west, earlier this week, which is currently translating over our region. A very strong high pressure ridge built in along the West Coast, northward into Canada, **with record warmth in the lower and middle layers of the atmosphere (as measured by balloon soundings).** Over the Puget Sound region, last Monday, temperatures of 85-95F occurred under this ridge with a light offshore flow (image 4). Officially, the high of 89F at the Sea-Tac airport that day shattered not just their daily high temperature record, but also the all-time monthly record, and the earliest 80F+ record. In addition, the four days of 80F+ highs there on the 17th-20th, broke the April record for number of days with maximum temperatures of 80F or greater. Now this upper ridge with record-breaking warmth is over the NRGAs and numerous daily maximum temperature records will likely be broken today and tomorrow over the Idaho and Montana PSAs. Fortunately, much cooler and more seasonable conditions will occur region-wide beginning Saturday.

Naturally, questions arise as to whether these anomalously warm conditions have a global warming signature. Most analyses of short-term heat events have estimated that, **rather than the event itself being an effect, that a portion of the excess heat is, and as such, 2-4F of excess temperature increase can often be attributed.** Globally speaking, the Earth is in the midst of an extraordinary heat wave during the past 11 months, bolstered by the strongest El Nino event ever measured, which tends to re-distribute excess oceanic heat, back to the atmosphere, over a large portion of the globe. Images 2 and 3 depict global temperature anomalies for March this year, and January-March, as well global anomalies during previous El Nino years. **It stands out that the excess warmth from this past year's El Nino is much greater, than in previous events, because of the underlying overall warming of the oceanic-atmospheric system,** from the increased radiative forcing caused by our increasing atmospheric carbon dioxide and methane levels.

The following article documents the global warmth these past many months, but also emphasizes the El Nino aspect of it, and that a return to La Nina conditions later this year will help turn down the heat, so to speak, to some extent.
<http://www.climatecentral.org/news/march-continues-streak-exceptional-global-warmth-20258>

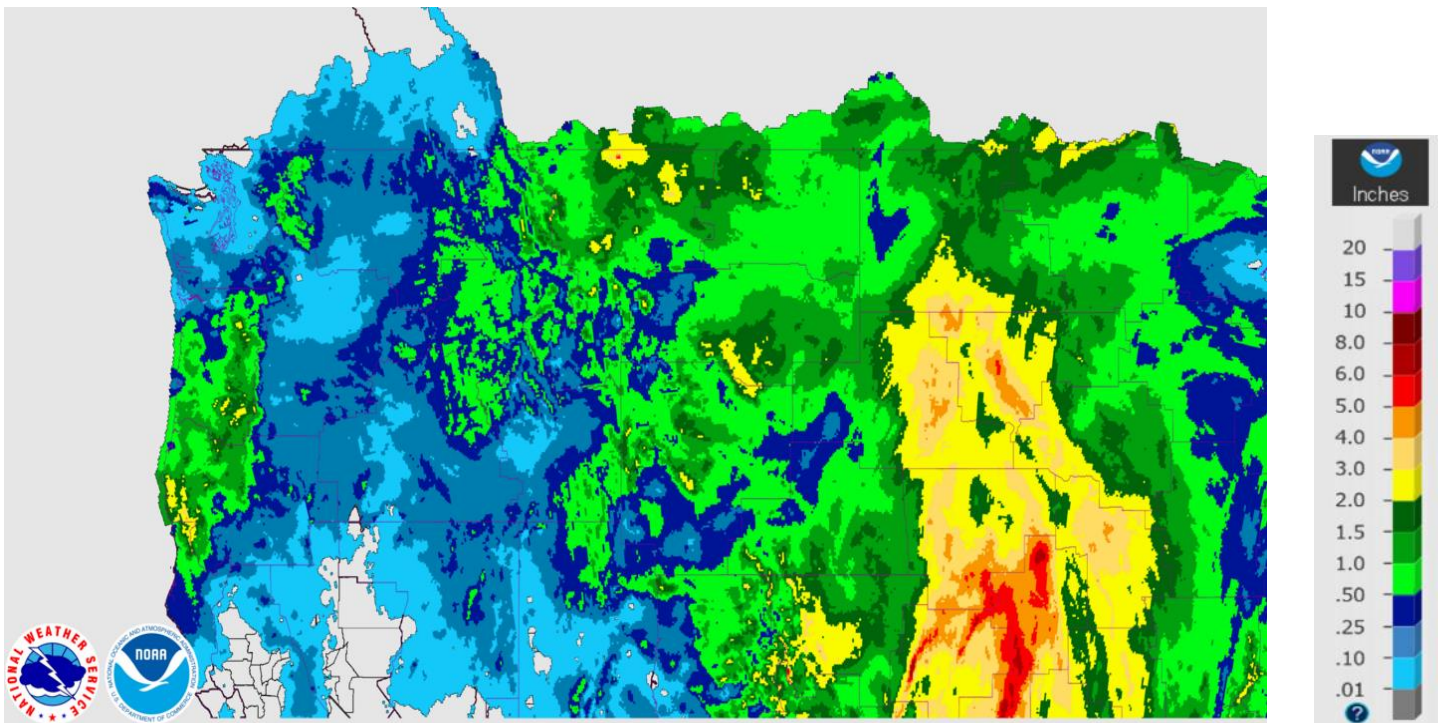
Shifting back to NRGAs concerns, **the great warmth we are seeing over the western PSAs the last few days, which will be continuing through tomorrow, is certainly having an effect. Accelerating snowpack melt, and our already early green-up (image 6). And as we see in 5), our PSA 04/West Montana 100 hour fuel moisture plot, bringing significant dead fuel moisture losses.** Images 7 and 8 are of two low and middle elevation SNOTEL sites SWE plots, Lookout, in PSA 01 at 5140 ft., and Lick Creek in PSA 12 (due south of Bozeman) at 6860 ft., this winter, and from last winter. These are showing that melt-off will be approaching very soon, just as in 2015, in these areas, unless a pattern change occurs. **Fortunately, just such a transition to a cooler and more seasonable pattern is expected starting tomorrow night.**

Images 9, and 10, the NWS 7-Day precipitation forecast, and high resolution model 72 hour snowfall forecast during the 6pm Friday to 6pm Monday period (when the bulk of the snowfall is expected western PSAs for the coming week), **depict generous precipitation amounts over the entire region, except for far NE Montana and northern North Dakota.**

There are still some discrepancies in the long-range models, but a series of low pressure troughs will be moving onshore in Northern California and Oregon the next several days, and tracking slightly to the south of the region. Then possibly re-curve northeast from the Great Basin toward Southeast Montana and South Dakota. **Temperatures in the western PSAs will drop back to near or even slightly below average levels (especially Saturday), and generally remain there through the coming week.** There will be some mountain snowpack addition, especially over the southern half of the NRGAs, but more importantly, **melting rates will slow, and the cooler temperatures, higher humidities, and occasional precipitation, will also help dead fuel moistures trend back toward more seasonable levels.** The middle elevation snowpack along the Bitterroot Divide in PSA 06 near Granite Pass had already lost half its depth on the 15th (last Friday), from two weeks previous (but was still continuous, images in 11).

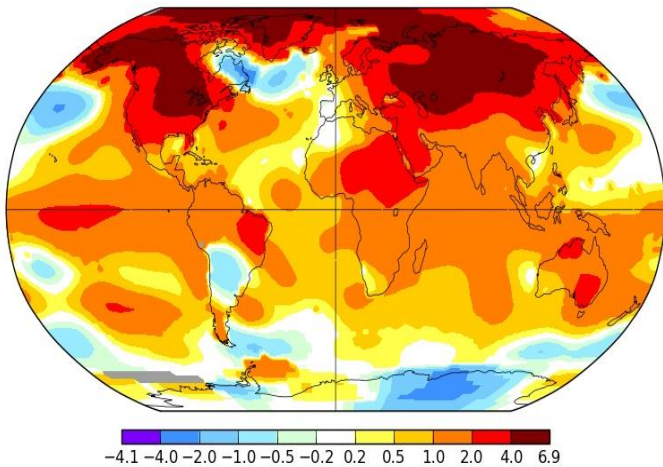
One other potentially interesting event associated with the excess warmth this week, **will be greater thunderstorm potential over the western PSAs tomorrow, as a cold front moves into North Idaho and Western Montana during the late afternoon/evening.** While none are expected to be severe, and they will contain more than .10, some could contain small hail, and strong gusty winds, **along with more lightning than we usually expect to see in April.** This heightened thunderstorm potential will shift east of the Divide Saturday, and **there could be some stronger storms over Southeast Montana and Southwestern North Dakota then.** Overall, expect a much cooler and moist weekend over the Western PSAs, moving east into North Dakota by Sunday.

Cheers,



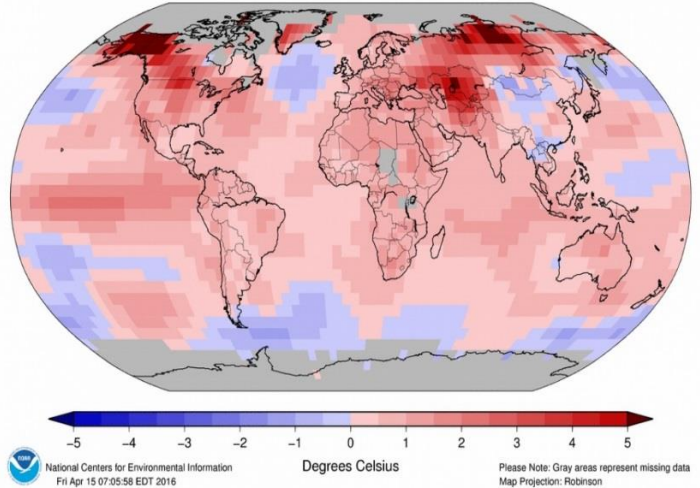
1) NWS Observed 7-Day Precipitation, Ending 0600 MST Today

March 2016 L-OTI(°C) Anomaly vs 1951-1980 1.29



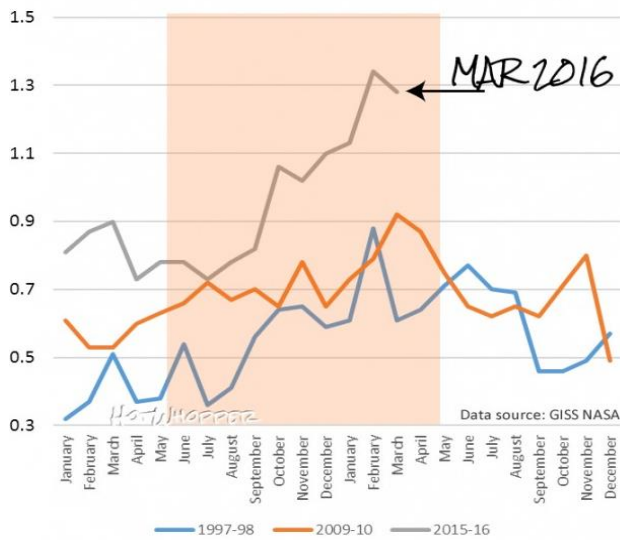
Land & Ocean Temperature Departure from Average Jan-Mar 2016
(with respect to a 1981-2010 base period)

Data Source: GHCN-M version 3.3.0 & ERSST version 4.0.0

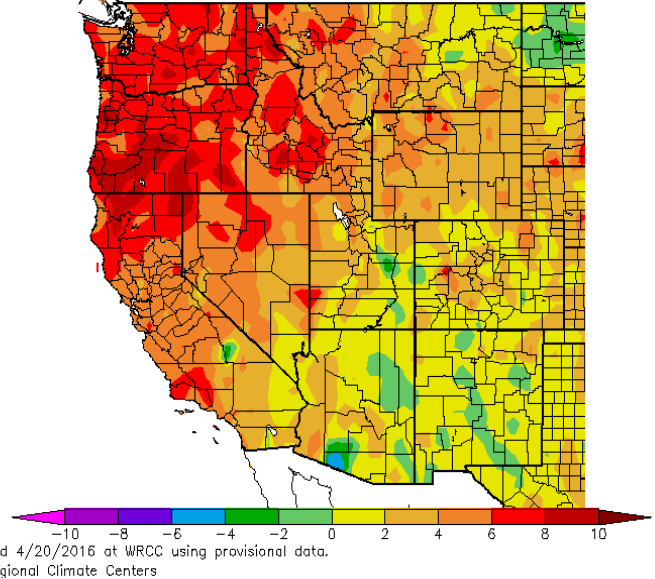


2) NASA – GISS March 2016 Global Temp. Anomalies and NOAA Jan-Mar 2016 Global Temp. Anomalies

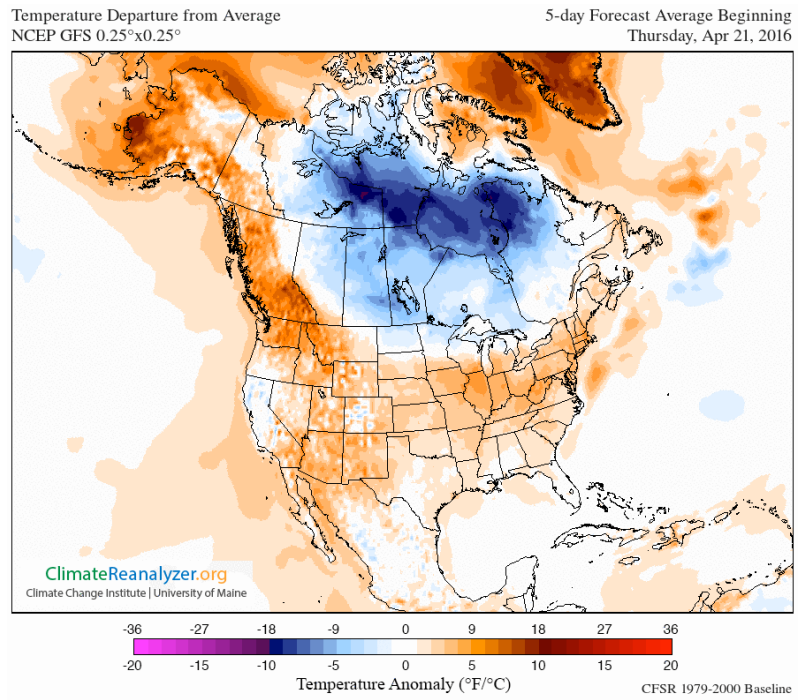
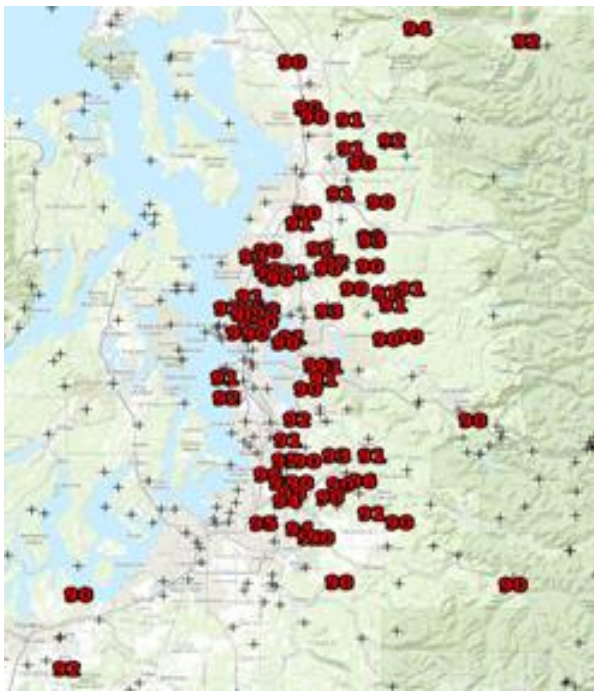
GISTemp El Nino Years
Anomaly from 1951-1980 Mean °C



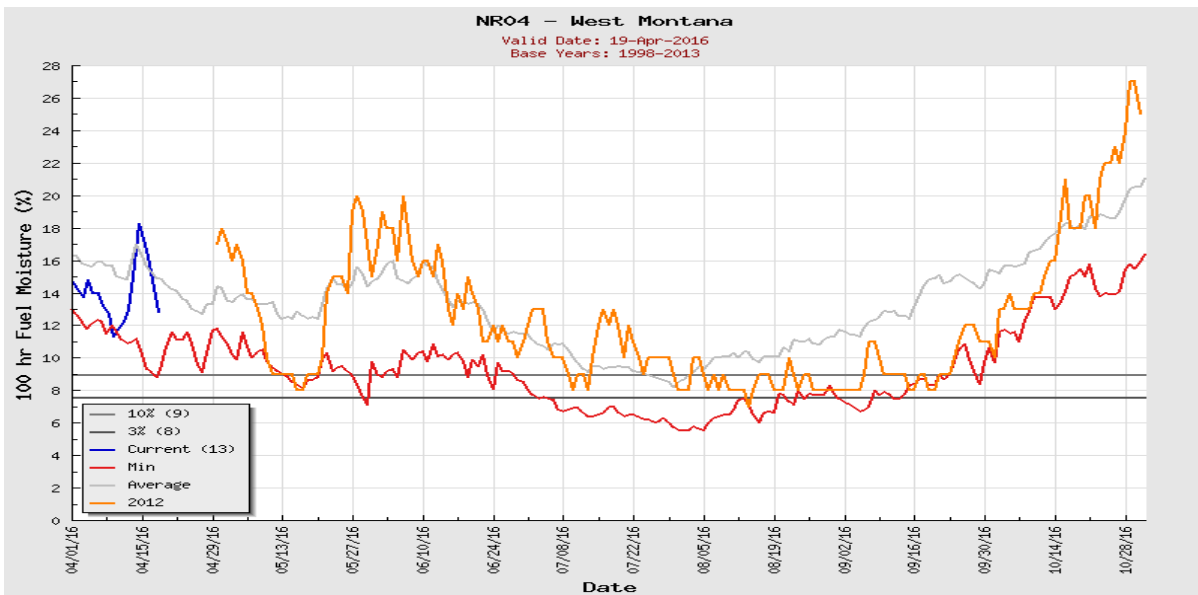
Ave. Temperature dep from Ave (deg F)
4/6/2016 – 4/19/2016



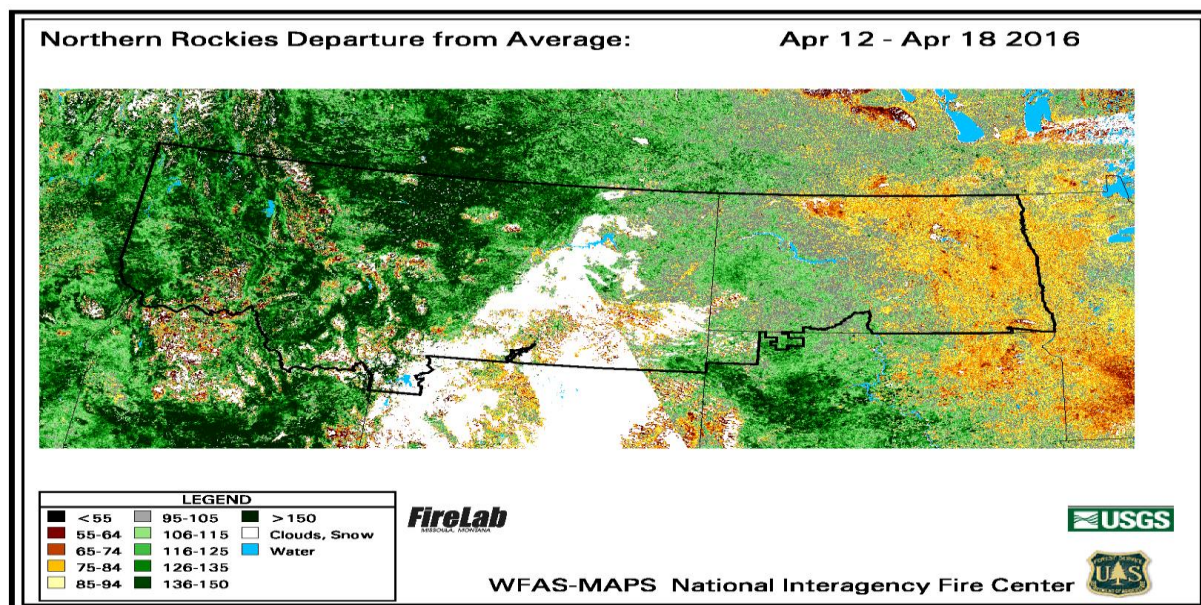
3) NASA GISS El Nino Years Monthly Global Temp. Anomalies and NOAA/WRCC Western US 14-Day Anom.



4) NWS Observed Max. Temps, Puget Sound, WA, Monday 18 April and GFS Model 5-Day Temp. Anomaly Fcst.

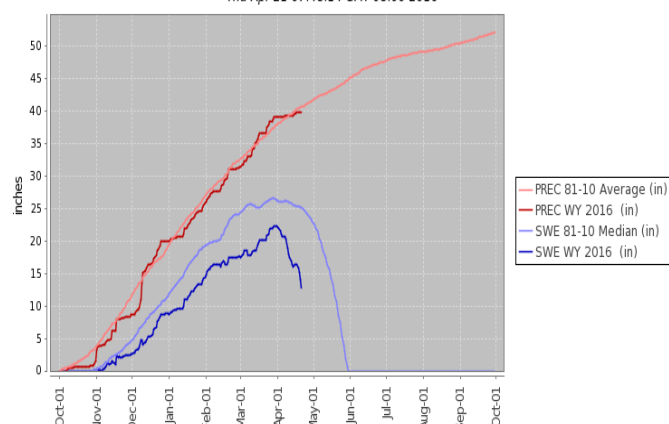


5) NGRA Predictive Service Area (PSA) 04/West Montana 100 Hour Fuel Moisture Plot – 2016

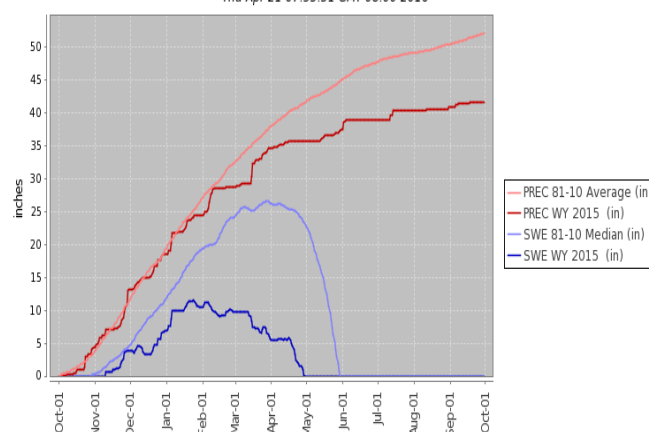


6) NR Satellite-Derived Departure From Average Greenness 12-18 April 2016

Station (594) WATERYEAR=2016 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision
Thu Apr 21 07:48:14 GMT-08:00 2016

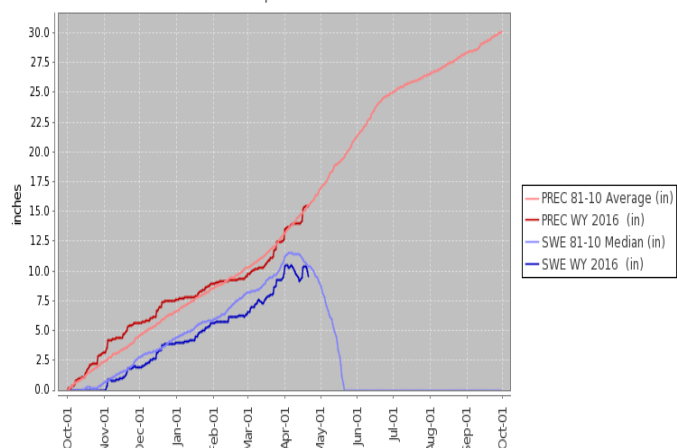


Station (594) WATERYEAR=2015 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision
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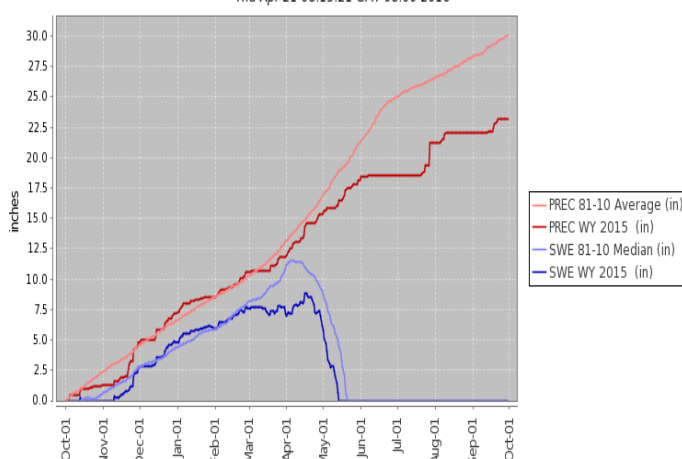


7) Lookout, ID SNOTEL (PSA 01- 5140 ft.) SWE Plot Winter 2015/16 and Winter 2014/2015

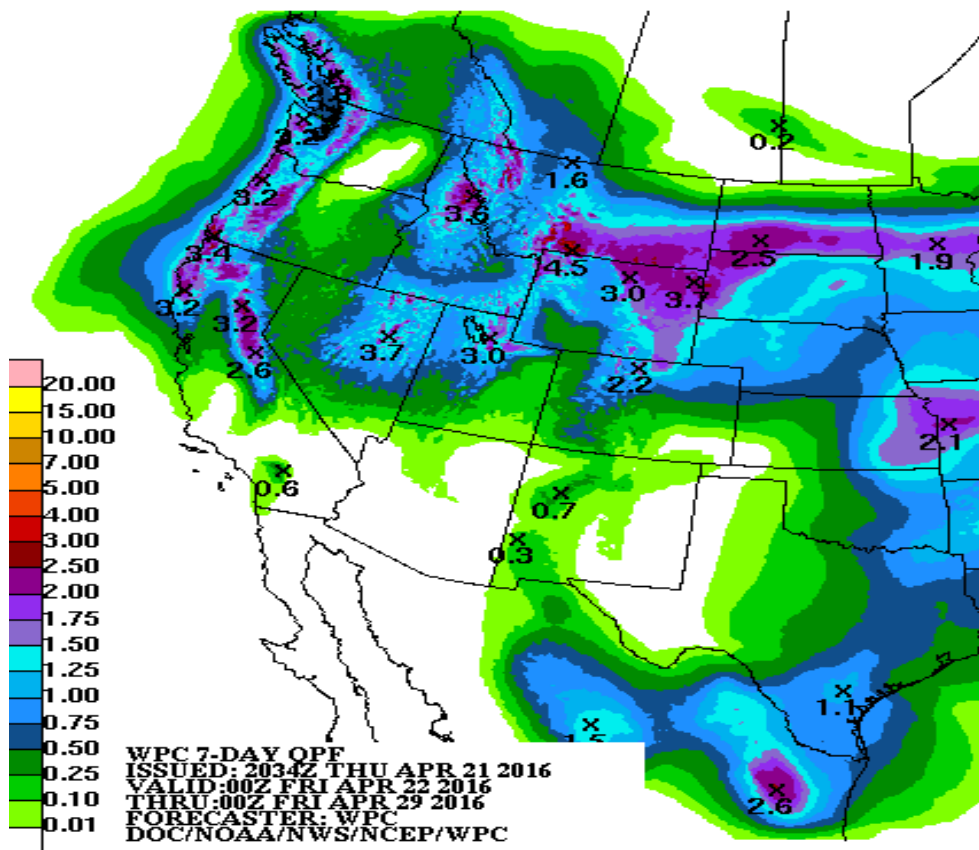
Station (578) WATERYEAR=2016 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision
Thu Apr 21 08:14:48 GMT-08:00 2016



Station (578) WATERYEAR=2015 (Daily) NRCS National Water and Climate Center - Provisional Data - subject to revision
Thu Apr 21 08:15:21 GMT-08:00 2016



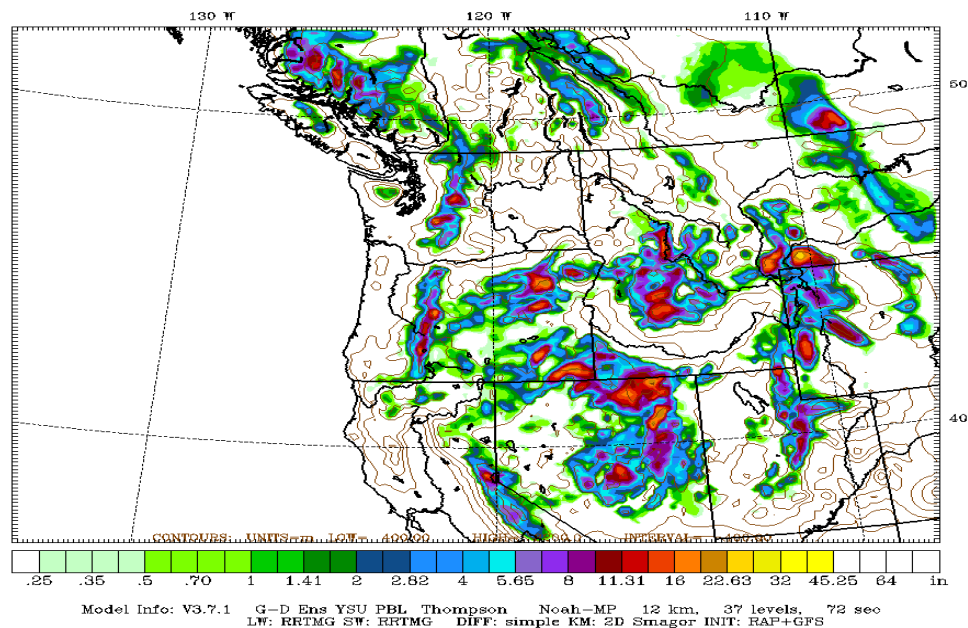
8) Lick Crk., MT SNOTEL (PSA 12- 6860 ft.) SWE Plot Winter 2015/16 and Winter 2014/2015



9) NWS 7-Day Total Precipitation Forecast, Ending 6pm Thursday 28 April

UW WRF-GFS 12km Domain
 Fcst: 198 h
 72HR Snowfall (in)
 Terrain height AMSL

Init: 12 UTC Thu 21 Apr 16
 Valid: 00 UTC Tue 26 Apr 16 (17 PDT Mon 25 Apr 16)



10) High Resolution 72 Hour Model Snowfall Forecast, 6pm Friday 22 April to 6pm Monday 26 April



11) Snowpack at 6200 ft., Granite Pass, Along Bitterroot Divide, PSA 06 Friday 15 April (M.Richmond)

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